Estech Co.. Ltd.
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Test Report for FCC

FCC ID : TKWBMCOMBOD-S20

Report Number		ESTF151508-005		
Applicant	Company name	Suprema Inc.		
	Address	16F Parkview Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea		
	Telephone	+82-31-7104922		
	Contact Person	Dongmok Shin		
	Factory address	16F Parkview Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea		
Product	Product name	Scanner (BioMini Combo Dual(S20))		
	Model No.	BioMini Combo Dual(S20)	Manufacturer	Suprema Inc.
	Serial No.	NONE	Country of origin	KOREA
Test date	21-Aug-15		Date of issued	28-Aug-15
Test location	347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea			
Standard	FCC PART 15 Subpart B, ANSI C 63.4 2009			
Test item	■ Conducted Emission	□ Class A ■ Class B	Test result	OK
	■ Radiated Emission	□ Class A ■ Class B	Test result	OK
Measurement facility registration number	659627			
Tested by	Senior Engineer K.H. Chung (Signature)			
Reviewed by	Engineering Manager J.M. Yang (Signature)			
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable			

* Note

- This test report is not permitted to copy partly without our permission
- This test result is dependent on only equipment to be used
- This test result based on a single evaluation of one sample of the above mentioned

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Contents

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul 153-759, R. O. Korea

EMC Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea

1.3 Official Qualification(s)

MSIP : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Conformity Assessment Body(CAB) with registration number 659627 under APEC TEL MRA between the RRA and the FCC.

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Product	: Scanner (BioMini Combo Dual(S20))
Model Number	: BioMini Combo Dual(S20)
Serial Number	: NONE
Manufacturer	: Suprema Inc.
Country of origin	: Korea
Sample Receipt Date	: 3-Aug-15
Rating	: Via USB Port(DC 5 V, 420 mA MAX)
¨ X-tallist(s) or Frequencies generated	: USB(2.0 / 480 Mbps), RFID 13.56 MHz

2.2 General descriptions of EUT

Fingerprint Sensor	Optical
Resolution	500 dpi, 256 gray
Platen Size	18.0mmx25.4mm(0.71"x1.0")
Sensing Area	17.0mmx25.0mm(0.67"x0.99")
Image Size	320x480 pixels
Interface	USB2.0 High Speed
Operating System	MS Windows/ Linux(32/64bit)
Operating Temp./Humidity	-10℃~50℃ / 0~90%
Weight	0.40 kg
Certificates	CE, FCC, KCC, UL or CB, WHQL, USB-IF, WEEE
Smart Card Reader **Contactless Smart Card Reader**	ISO7816 Class A/B/C (5V, 3.0V, 1.8V) T=0 , T=1 EMV2000 contact smart card with SAM slot(optional, max 2x SAM) Interface: USB2.0 CCID , PC/SC driver **ISO/IEC 14443 A&B, Mifare, FeliCa** **NFC Forum tag types (Jewel, Mifare Ultralight, FeliCa, FeliCa lite, Mifare Desifare)** **EMV2000 contactless smart card** **Frequency: 13.56 MHz +- 7KHz** **Distanace transaction: Up to 10cm** **Baud: 106/212/424/848 kbit/s** **Interface: USB2.0 CCID, PC/SC driver**
Dimension(WxLxH)	95.7mmx114.8mmx52.6mm

3. Test Standards

Test Standard : FCC PART 15 Subpart B

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.4 (2009)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain decides that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment These method apply to the measurement of individual units or systems comprised of multiple units

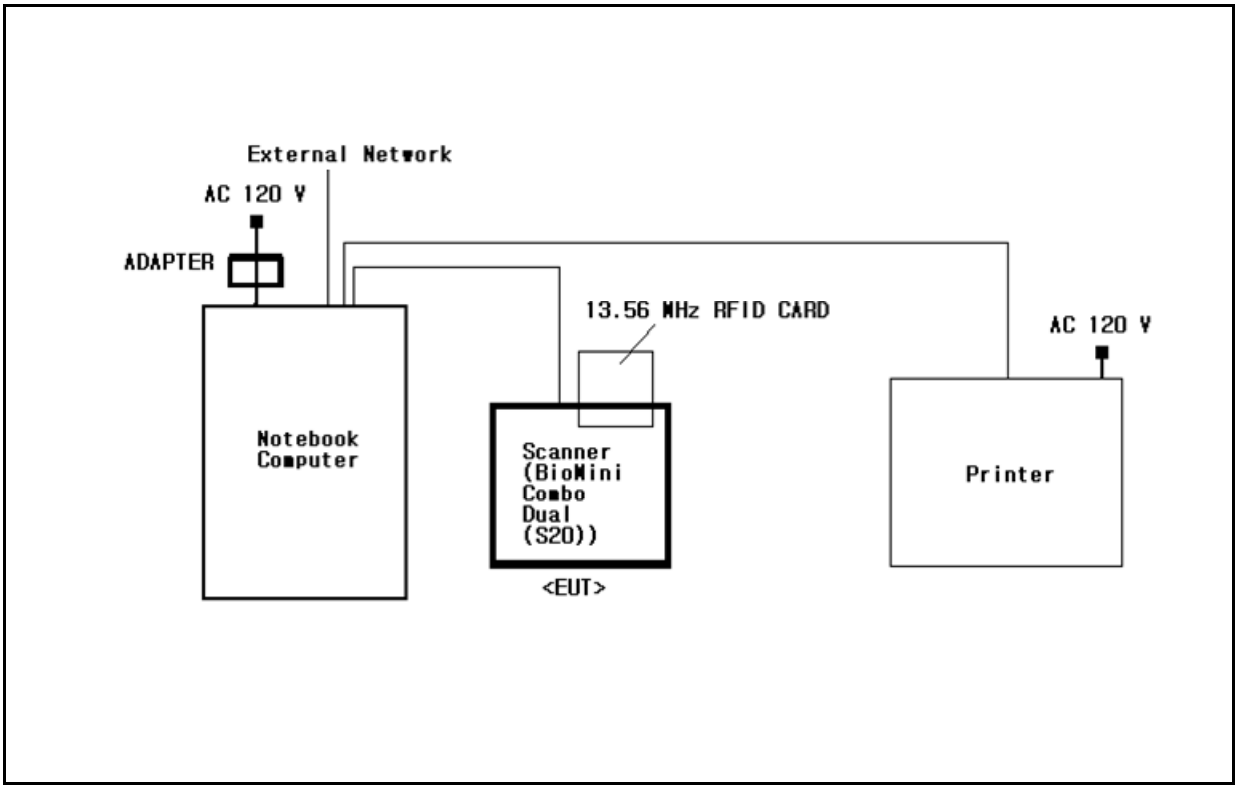
4. Measurement Condition

4.1 EUT Operation.

- The EUT was in the following operation mode during all testing.

1. Connect the EUT to USB port of the Note PC.
2. Install the provided test program by the manufacturer.
3. Execute the test program and check the operating status of the EUT.
   > Check fingerprint detection and display on the note pc continuously.

4.2 Configuration and Peripherals



4.3 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
Scanner (BioMini Combo Dual(S20))	BioMini Combo Dual(S20)	NONE	Suprema Inc.	EUT
RFID CARD	NONE	NONE	Suprema Inc.	
Notebook Computer	P30G	NONE	Dell Inc.	
Adapter	AA90PM111	NONE	Acbel Electronic (Dong Guan) Co., Ltd	
Printer	K10229	NONE	CANON VIETNAM CO.,LTD.	

4.4 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
Scanner (BioMini Combo Dual(S20))	USB	Notebook Computer	USB	1.0	Shielded	
Scanner (BioMini Combo Dual(S20))	13.56 MHz	RFID CARD	13.56 MHz	-	-	
Notebook Computer	LAN	External Network	LAN	20.0	Unshielded	
Notebook Computer	Power	Adapter	-	2.0	Shielded	
Notebook Computer	USB	Printer	USB	2.0	Shielded	

5. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC PART 15 Subpart B. The test setup was made according to ANSI C 63.4 (2009) on an 10 m semi-anechoic chamber, which allows a 3 m distance measurement. The EUT was placed in the center of Plastic table. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

5.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESCI7	ROHDE & SCHWARZ	100916	13-Jan-16
Logbicon Antenna	VULB 9168	SCHWARZBECK	237	4-Mar-16
Turn Table	DT3000-2t	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
PREAMPLIFIER	8449B	AGILENT	3008A00595	13-Jan-16
Test Receiver	ESPI7	ROHDE & SCHWARZ	100185	13-Jan-16
Horn Antenna	BBHA 9120D	SCHWARZBECK	352	7-May-16
Turn Table	DT1500-S	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	C02000-P	Innco System GmbH	CO2000/642 /28051111/L	-

5.2 Environmental Condition

Below 1 GHz -Test Place : 10 m Semi-anechoic chamber

Temperature (°C) : 21.1 ℃

Humidity (% R.H.) : 57.1 % R.H.

Above 1 GHz-Test Place : 3 m Semi-anechoic chamber

Temperature (°C) : 21.0 ℃

Humidity (% R.H.) : 57.2 % R.H.

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5.3 Test data (Below 1 GHz)

Test Date : 21-Aug-15 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
59.50	20.92	V	1.4	12.34	1.34	40.00	34.61	5.39
269.80	24.05	H	2.4	12.39	2.80	46.00	39.24	6.76
293.10	22.30	H	2.7	13.21	2.92	46.00	38.42	7.58
320.50	21.41	V	1.4	13.94	3.04	46.00	38.39	7.61
480.00	17.31	H	2.3	17.58	3.73	46.00	38.61	7.39
496.60	14.06	V	1.1	17.94	3.80	46.00	35.79	10.21
587.00	18.69	V	1.0	19.76	4.13	46.00	42.58	3.42
750.40	11.94	H	1.7	21.96	4.72	46.00	38.62	7.38

Remark	H : Horizontal, V : Vertical *Result Value = Reading + Ant Factor + Cable loss *Margin= Limit - Result *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection

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5.4 Test data (Above 1 GHz)

Test Date : 21-Aug-15 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
1488.00	47.15	H	1.4	25.62	-30.45	74.00	42.31	31.69
1488.00	46.76	V	1.0	25.62	-30.45	74.00	41.92	32.08
1584.00	45.78	H	1.0	25.71	-30.09	74.00	41.40	32.60
1584.00	45.75	V	1.0	25.71	-30.09	74.00	41.37	32.63
1840.00	49.27	H	1.0	25.96	-29.54	74.00	45.69	28.31
1840.00	45.73	V	1.1	25.96	-29.54	74.00	42.15	31.85
Average(RBW:1 MHz VBW:10 Hz)								
1488.00	38.89	H	1.1	25.62	-30.45	54.00	34.05	19.95
1488.00	36.25	V	1.0	25.62	-30.45	54.00	31.41	22.59
1584.00	38.19	H	1.0	25.71	-30.09	54.00	33.81	20.19
1584.00	35.50	V	1.0	25.71	-30.09	54.00	31.12	22.88
1840.00	36.34	H	1.0	25.96	-29.54	54.00	32.76	21.24
1840.00	38.21	V	1.1	25.96	-29.54	54.00	34.63	19.37

Remark

H : Horizontal, V : Vertical
* Result Value = Reading + Ant Factor + Cable loss - Amplifier Gain
* Margin= Limit - Result
* The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.

*Application method of the highest frequency is in the following
*Highest frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.
*Highest frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.
*Highest frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.
*Highest frequency of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz,

6. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC PART 15 Subpart B . The test setup was made according to ANSI C 63.4 (2009) in a shielded room. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m. The test receiver with Quasi Peak detector complies with CISPR 16.

6.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
Test Receiver	ESPI	Rohde & Schwarz	100005	13-Jan-16
LISN	ESH2-Z5	POLARAD	872461/048	16-Jan-16
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	13-Jan-16
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	NONE	13-Jan-16

6.2 Environmental Condition

Test Place : Shielded Room

Temperature (°C) : 22.4 ℃
Humidity (% R.H.) : 46.8 % R.H.

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6.3 Test data

Test Date : 21-Jun-15

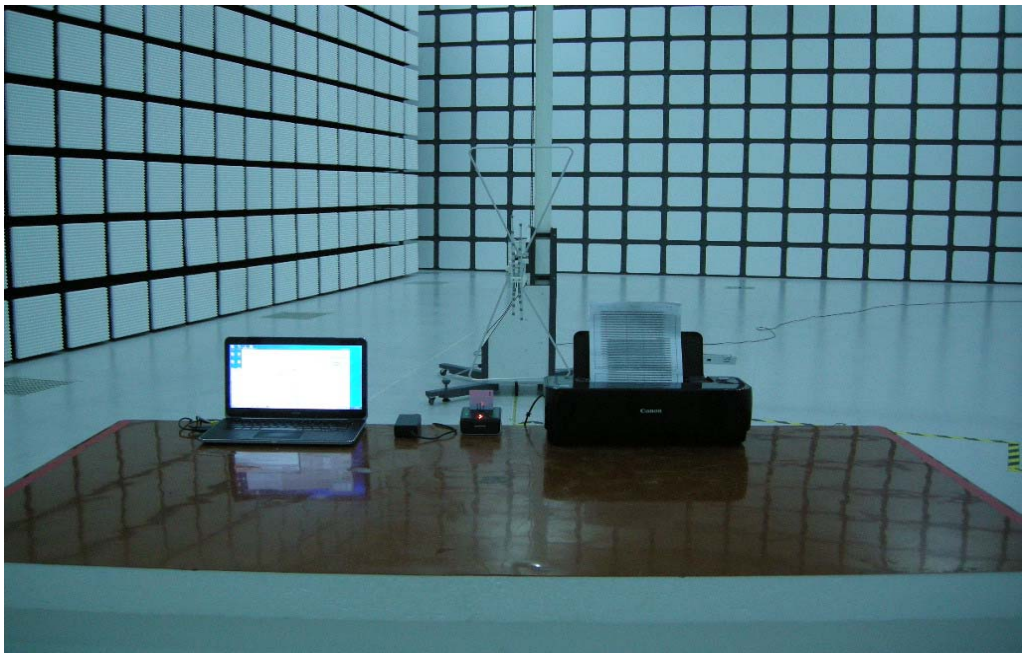
Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Cispr Average Value		
	Lisn (dB)	Cable (dB)		Limit (dBμV)	Reading (dBμV)	Result (dBμV)	Limit (dBμV)	Reading (dBμV)	Result (dB)
0.15	0.12	0.12	H	66.00	45.60	45.84	56.00		
0.15	0.10	0.12	N	66.00	44.40	44.62	56.00		
0.16	0.12	0.12	H	65.46	44.48	44.72	55.46		
0.21	0.10	0.13	H	63.21	42.77	43.00	53.21		
0.21	0.11	0.13	N	63.21	44.13	44.37	53.21		
16.96	0.60	0.41	H	60.00	38.51	39.52	50.00		

Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading

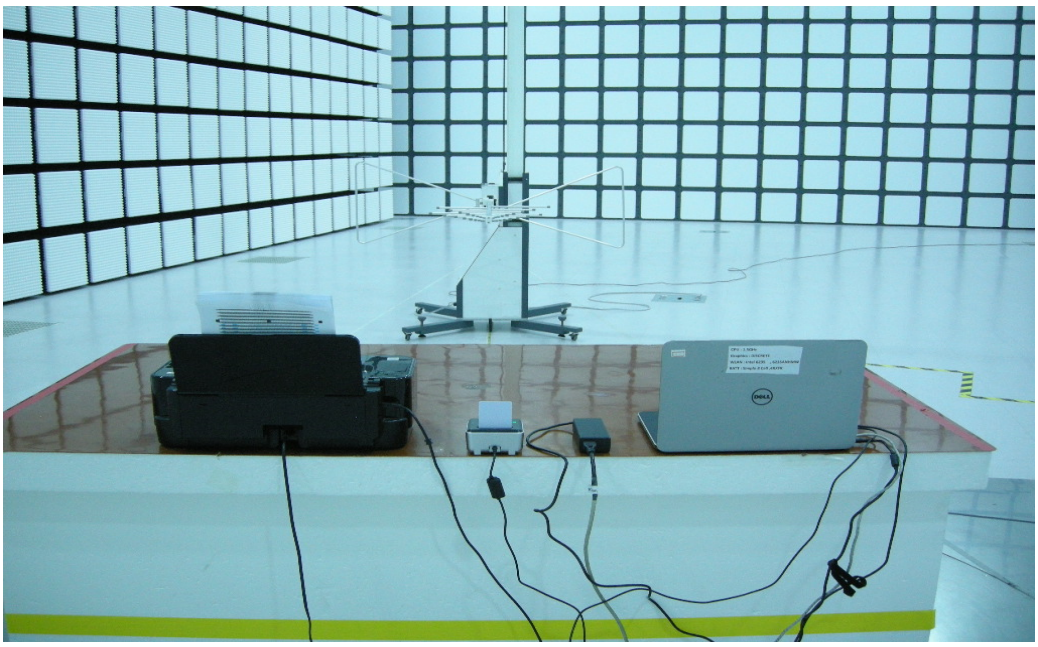
7. Photographs of test setup

7.1 Setup for Radiated Test : (30 ~ 1 000) MHz

[Front]

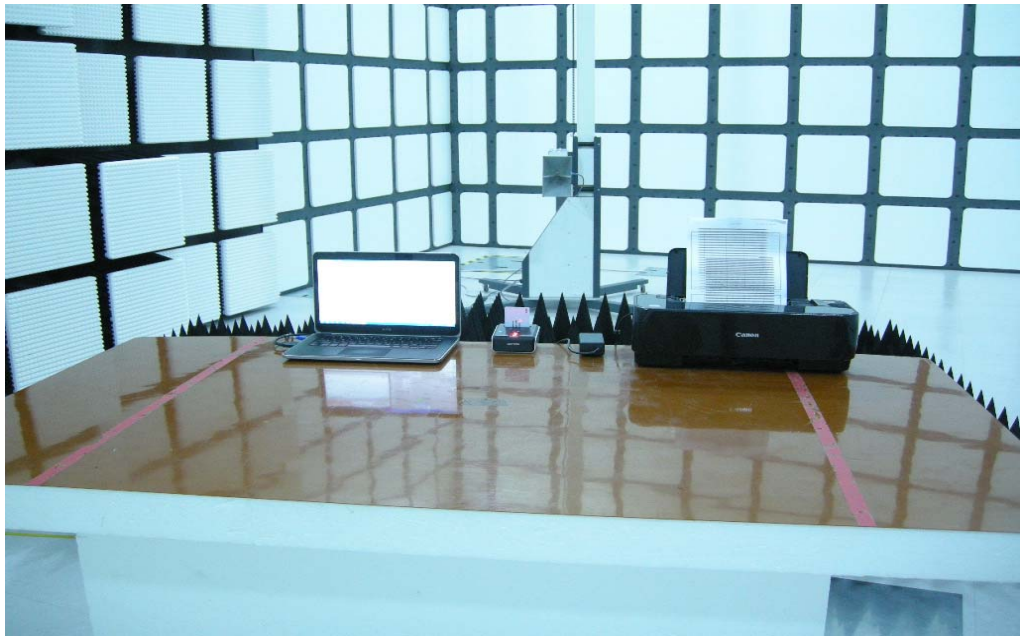


[Rear]

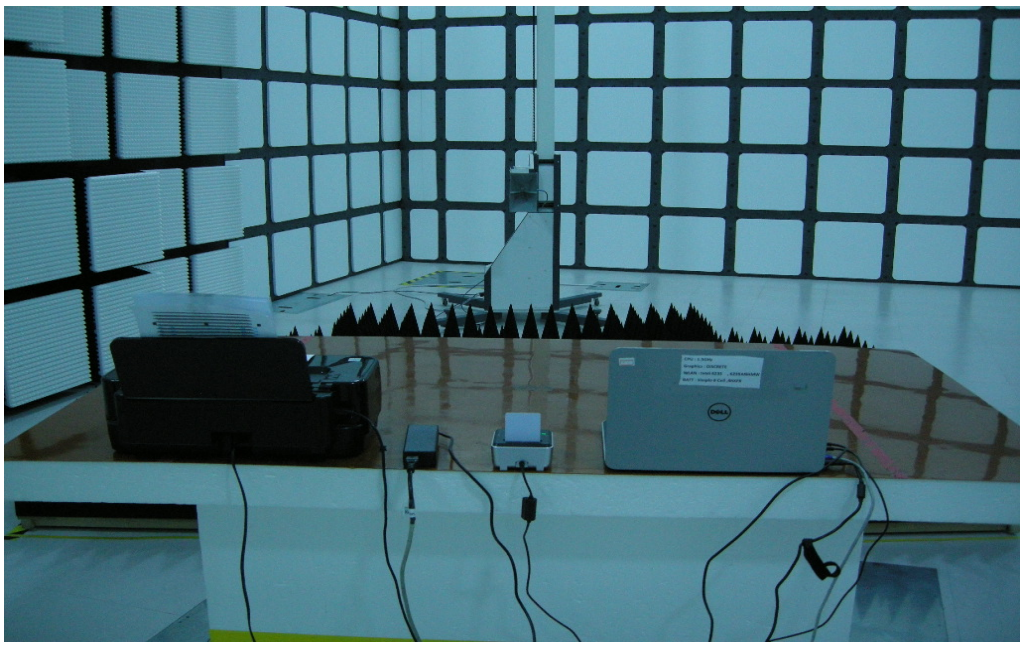


7.2 Setup for Radiated Test : above 1 GHz

[Front]



[Rear]



7.3 Setup for Conducted Test : (0.15 ~ 30) MHz

[Front]

[Rear]

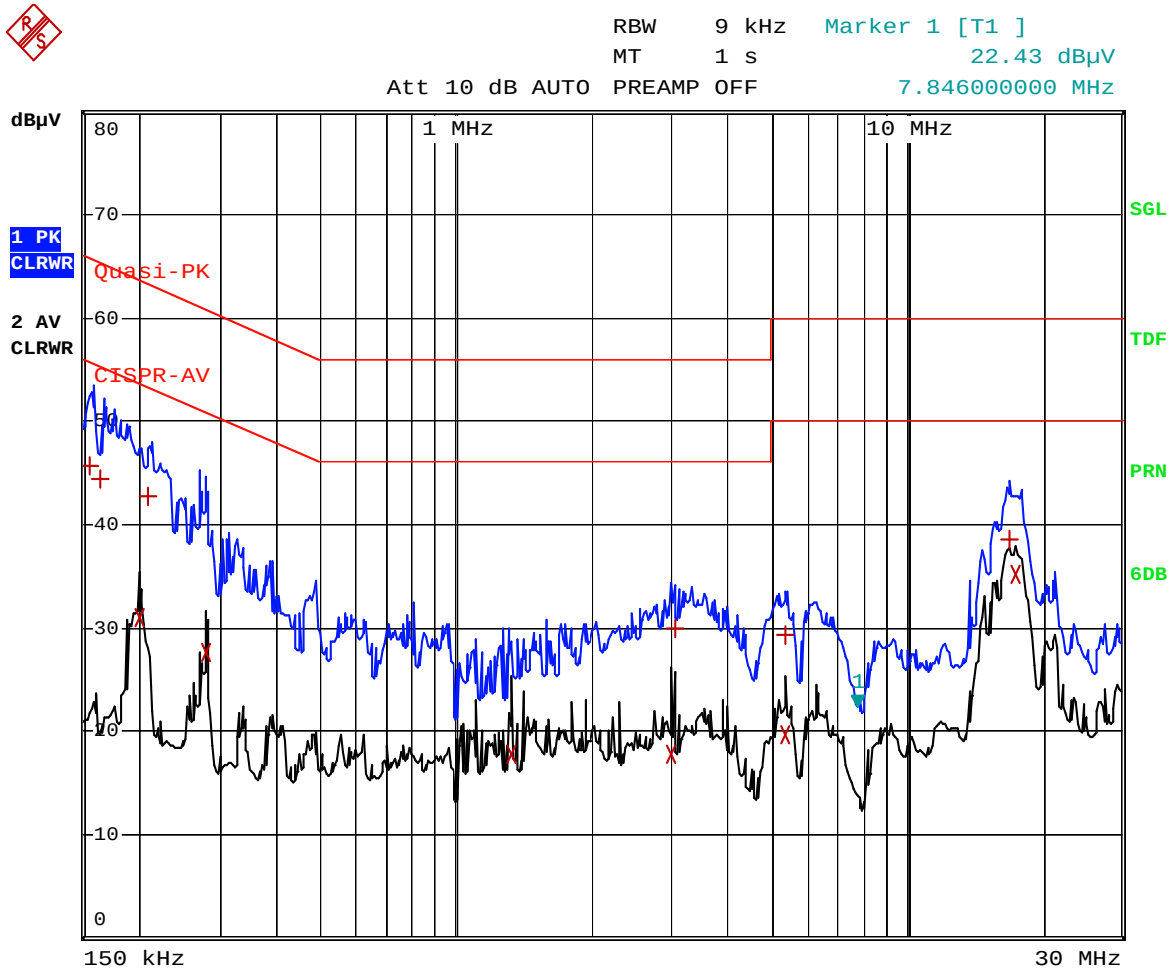
8. Photographs of EUT

[Front]

[Rear]

Appendix 1. Special diagram

*HOT



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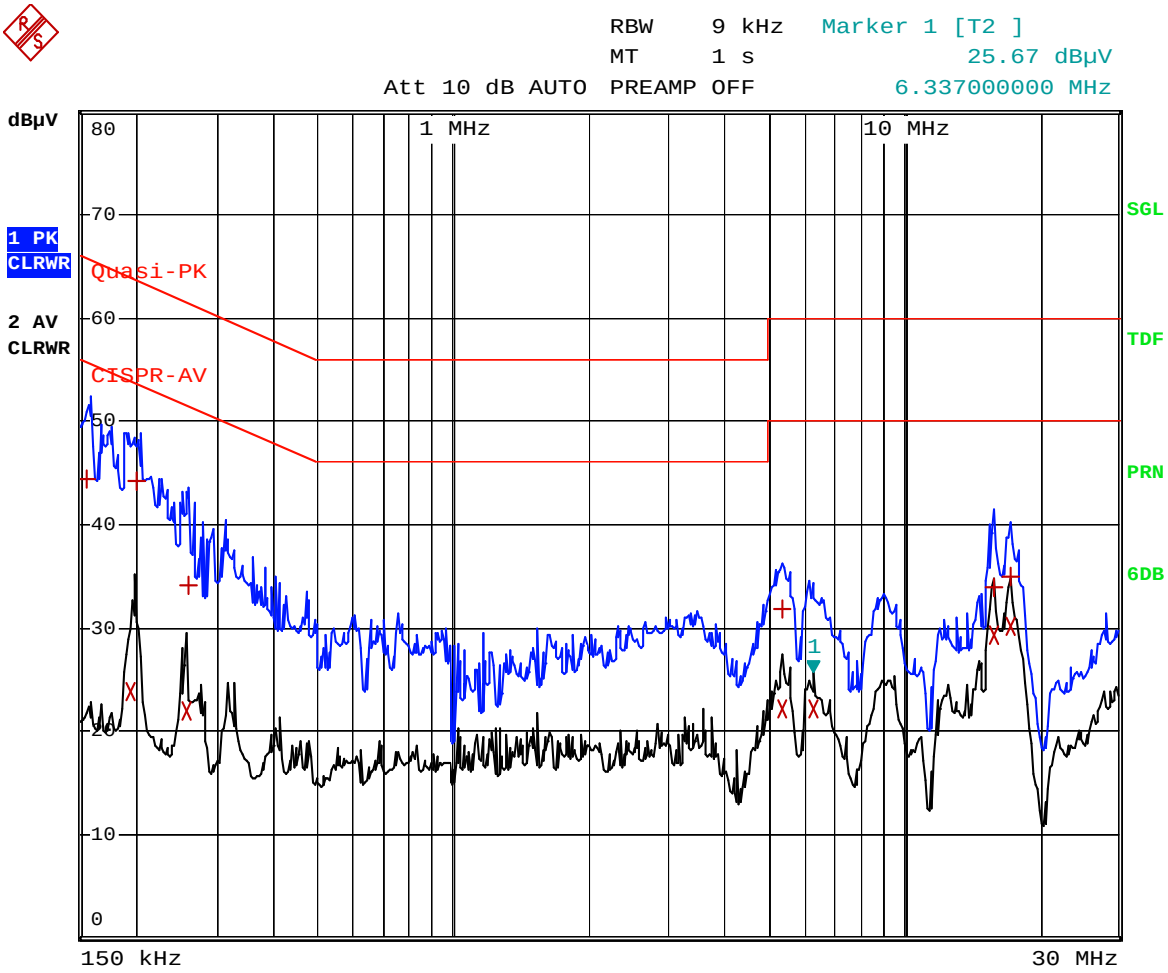

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